

WHAT IS CLAIMED IS:

1. A method of increasing loading of active enzyme immobilized in a polyurethane polymer, the method comprising the steps of:

synthesizing the polyurethane polymer in a reaction mixture containing water and enzyme; and

including a sufficient amount of a surfactant in the reaction mixture to increase enzyme activity at an enzyme loading.

2. The method of Claim 1 wherein the surfactant is nonionic and the enzyme loading is greater than approximately 0.1 percent by weight of the polyurethane polymer.

3. The method of Claim 1 wherein the enzyme loading is greater than approximately 0.5 percent by weight of the polyurethane polymer.

4. The method of Claim 1 wherein the enzyme loading is greater than approximately 1 percent by weight of the polyurethane polymer.

5. The method of Claim 2 wherein enzyme immobilized in the polyurethane polymer includes at least one of an oxidoreductase, a transferase, a hydrolase, a lyase, an isomerase or a ligase.

6. The method of Claim 2 wherein enzyme immobilized in the polyurethane polymer includes at least one of a protease, a lipase, a peroxidase, a tyrosinase, a glycosidase, a nuclease, a aldolase, a phosphatase, a sulfatase, or a dehydrogenase.

7. The method of Claim 2 wherein at least two species of enzyme are co-immobilized within the polyurethane polymer.

8. The method of Claim 7 wherein the two species of enzyme are within the same class of enzyme.

9. The method of Claim 2 wherein the surfactant comprises between 0.5 to 5.0 weight percent of the aqueous component of the mixture.

10. The method of Claim 1 wherein the enzyme is a hydrolase and the surfactant is nonionic.

11. A polyurethane polymer containing an enzyme loading of more than approximately 0.1 weight percent enzyme, the polyurethane polymer having been synthesized in the presence of a sufficient amount of a surfactant to increase enzyme activity at the enzyme loading.

12. The polyurethane polymer of Claim 11 wherein the surfactant is nonionic.

13. The polyurethane polymer of Claim 12 wherein the enzyme loading is greater than approximately 0.5 percent by weight of the polyurethane polymer.

14. The polyurethane polymer of Claim 12 wherein
5 the enzyme loading is greater than approximately 1 percent by weight of the polyurethane polymer.

15. The polyurethane polymer of Claim 12 wherein enzyme immobilized in the polyurethane polymer includes at least one of an oxidoreductase, a transferase, a proteolytic enzyme, a lyase, an isomerase or a ligase.

16. The polyurethane polymer of Claim 12 wherein enzyme immobilized in the polyurethane polymer includes at least one of a protease, a lipase, a peroxidase, a tyrosinase, a glycosidase, a nuclease, a aldolase, a phosphatase, a sulfatase, a hydrolase, or a dehydrogenase.

17. The polyurethane polymer of Claim 12 wherein at least two species of enzyme are co-immobilized within the polyurethane polymer.

18. The polyurethane polymer of Claim 17 wherein the two species of enzyme are within the same class of enzyme.

19. The polyurethane polymer of Claim 12 wherein the surfactant comprises between 0.5 to 5.0 weight percent of the aqueous component of a reaction mixture.

20. The polyurethane polymer of Claim 12 wherein the enzyme is a hydrolase and the surfactant is nonionic.

21. A method of improving enzymatic activity in a polyurethane polymer synthesized with an enzyme loading of more than approximately 0.1 weight percent enzyme, the method comprising the step of:

5 adding a sufficient amount of a surfactant during synthesis of the polyurethane polymer to increase enzyme activity at the enzyme loading.

22. The method of Claim 21 wherein the surfactant is nonionic.

10 23. The method of Claim 22 wherein the enzyme loading is greater than approximately 0.5 percent by weight of the polyurethane polymer.

24. The method of Claim 22 wherein the enzyme loading is greater than approximately 1 percent by weight
15 of the polyurethane polymer.

25. The method of Claim 22 wherein enzyme immobilized in the polyurethane polymer includes at least one of an oxidoreductase, a transferase, a proteolytic enzyme, a lyase, an isomerase or a ligase.

26. The method of Claim 22 wherein enzyme immobilized in the polyurethane polymer includes at least

one of a protease, a lipase, a peroxidase, a tyrosinase, a glycosidase, a nuclease, a aldolase, a phosphatase, a sulfatase, a hydrolase, or a dehydrogenase.

27. The method of Claim 22 wherein at least two species of enzyme are co-immobilized within the polyurethane polymer.

28. The method of Claim 27 wherein the two species of enzyme are within the same class of enzyme.

29. The method of Claim 22 wherein the surfactant comprises between 0.5 to 5.0 weight percent of the aqueous component of the mixture.

30. The method of Claim 22 wherein the enzyme is a hydrolase and surfactant is nonionic.